

# IOWA STATE UNIVERSITY

## Digital Repository

---

Collections and Technical Services Publications and  
Papers

Collections and Technical Services

---

2005

## Using eclectic digital resources to enhance instructional methods for adult learners

Karen G. Lawson

*Iowa State University*, [klawson@iastate.edu](mailto:klawson@iastate.edu)

Follow this and additional works at: [http://lib.dr.iastate.edu/libcat\\_pubs](http://lib.dr.iastate.edu/libcat_pubs)



Part of the [Library and Information Science Commons](#)

The complete bibliographic information for this item can be found at [http://lib.dr.iastate.edu/libcat\\_pubs/51](http://lib.dr.iastate.edu/libcat_pubs/51). For information on how to cite this item, please visit <http://lib.dr.iastate.edu/howtocite.html>.

---

This Article is brought to you for free and open access by the Collections and Technical Services at Iowa State University Digital Repository. It has been accepted for inclusion in Collections and Technical Services Publications and Papers by an authorized administrator of Iowa State University Digital Repository. For more information, please contact [digirep@iastate.edu](mailto:digirep@iastate.edu).

---

# Using eclectic digital resources to enhance instructional methods for adult learners

## **Abstract**

*Purpose* – To demonstrate that adult learning can be improved through the use of eclectic digital resources to enhance instructional methods rather than through learning skills in isolation.

*Design/methodology/approach* – During the past two decades, a significant research has focused on adults as learners. Many adults take classes for skills improvement, job advancement, and personal understanding. The demand for training programs to help workers keep current and competitive is growing. It is likely that more adults from all walks of life will be continuing their education in a variety of settings. For example, librarians do instruction for their communities in the areas of internet searching, electronic database use, and personal computing skills. Many of their students are adults, including other library staff members, community members, and non-traditional students.

*Findings* – A learning program that includes digital resources helps provide the opportunity for instructors to help their students make connections and form relationships across the boundaries of classroom, discipline, skill, and background. By incorporating an eclectic assortment of digital resources into computer/internet-related training an instructor ensures that adult learners are better able to connect what they have learned in life and are learning in the classroom.

*Research limitations/implications* – Relies on availability of internet access.

*Practical implications* – Librarians are frequently in the position of providing computer/internet-related training for a wide variety of audiences, including adults.

*Originality/value* – Librarians are perfectly poised to combine sound pedagogy with their expert knowledge of available digital resources to promote adult achievement in technology education. An instruction program integrated with evocative digital resources provides the opportunity for instructors to reduce anxiety and to help their students make connections and form relationships across the boundaries of classroom, discipline, skill, and background.

## **Disciplines**

Library and Information Science

## **Comments**

This is a post-print of an article from *OCLC Systems & Services* 21, no. 1 (2005): 49–60, doi:[10.1108/10650750510578154](https://doi.org/10.1108/10650750510578154). Posted with permission.

## **Using Eclectic Digital Resources to Enhance Instructional Methods for Adult Learners**

Karen G. Lawson, *Iowa State University*

### **Adult Learners and Learning**

During the past two decades, a significant number of books, articles, and conference proceedings have focused on adults as learners. Many adults take classes for skill improvement, job advancement, and personal understanding. In business and industry, the demand for training programs to help workers keep current and competitive is growing. It is likely that more adults from all walks of life will be continuing their education in a variety of settings. One setting is in the library. Librarians are frequently in the position of providing computer/Internet-related training for a wide range of audiences, including adults. For example, librarians do instruction for their communities in the areas of Internet searching, electronic database use, and personal computing skills. Many of their students are adults, including other library staff members, community members, and non-traditional students.

Various authors have written about adults as learners. Apps (1981) writes about adults who are returning to college campuses. Smith and Associates (1990) study the concept of how adults learn across the lifespan. Mezirow (1991) describes the dynamics of how adults learn and how their perceptions are transformed by learning.

It is difficult to define who should be considered an “adult learner.” One widely accepted definition comes from Arthur Chickering, of the National Commission on Higher Education and the Adult Learner, who defines an adult learner as “an individual whose major role in life is something other than full-time student” (*Arthur Chickering on Intentional...*).

## Using Eclectic Digital Resources to Enhance Instructional Methods for Adult Learners

These adults are working to acquire skills necessary for their job or occupation or for home and personal responsibilities

This broad definition also includes adult “Lifelong Learners” and/or “Third Age Learners.” Lifelong Learners simply enjoy learning new skills, ways of thinking, or participating in an educational setting. The University of Pittsburgh has programs designed for those 55 years or older, which they consider to be Third Age. The University’s website for the program tells them:

You are not seniors ... You are not the elderly ... you are healthier and more vital than any generation ever before. Youth and middle age – the first two stages of your life – are chronologically behind you. You are in the Third Age of your life, when work and family responsibilities are lessened and curiosity and intellectual inquisitiveness now propels (sic) you to new dimensions.<sup>5</sup>

The University of Texas at Austin has a “Third Age University,” but their website declares “With retirement no longer defined by one’s age, the Third Age is the period of life to concentrate on ‘becoming’ instead of preparing (formal schooling) or doing (career).” Through continuing education an adult student of any age can become better prepared for changes that occur in life.

The types of learning projects that adults engage in are important in helping us to understand what motivates adults to learn. For example, a great number of learning projects are related to a person's job or occupation. Some of the other projects include learning for home and personal responsibilities, for interest or leisure, or for improving a broad area of competence. Allen Tough defined a learning project as “a highly deliberate effort to gain and retain certain definite knowledge and skill, or to change in some other way” (1978, p. 250). Tough gives examples of learning projects undertaken by adult learners: how to repair

## Using Eclectic Digital Resources to Enhance Instructional Methods for Adult Learners

a car, how to weatherize a house, taking a graduate course, learning to be a parent, learning how to speak publicly, and studying about another country before taking a trip.

Tough's research shows that adults have a rich reservoir of experience that can serve as a resource for learning. They have accumulated a foundation of life experiences and knowledge that may include work-related activities, family responsibilities, and previous education. Their life situation changes and motivational factors add a further complexity to adult education. Adults may be motivated to learn due to internal or intrinsic factors such as helping their child with homework or the luxury of having an opportunity to learn more about a subject in which the individual has always been interested. Motivation can also be from external or extrinsic forces such as the possibility of a raise in salary or the dismal prospect of losing a job.

In *The Culture of Education* (1996), Bruner discusses the implications of combining adult potential with adult instruction utilizing four critical elements of learning:

- **agency** involves learners' taking increasing control of their own mental activity. In this view learners are "proactive, problem-oriented, attentionally focused, selective, constructional, directed to ends", and what "gets into" their minds is more a function of the approach than the information they are bombarded with.
- **collaboration** requires "sharing the resources of the mix of human beings involved in teaching and learning". Agency, combined with collaboration, provides synergy between teachers and learners.
- **reflection** helps students make sense of what they learn, "not simply 'learning in the raw' but making what you learn make sense, understanding it".

- ***culture*** is “the way of life and thought that we construct, negotiate, institutionalize, and finally end up calling ‘reality’ to comfort ourselves”.

Adult learners come to learning with a wide range of previous experiences, knowledge, self-direction, interests, and competencies. One of the most difficult aspects of education is determining how to relate a given topic or concept to the particular frameworks of many individuals. Agency, collaboration, reflection, and culture offer adult learners, who differ dramatically in the learning skills and strategies they currently possess, opportunities for active engagement, cooperation, and cultural expression in the classroom. Finding an appropriate conceptual hook for each individual is crucial to the development of meaningful learning opportunities. Adult learners, because they have more life experience than younger learners, also have the potential of offering more hooks for the instructor to use to “get into their minds.”

Adults, even though they may have completed formal schooling, have a wide range of educational needs. Change is constant in many life situations. Currently, one of their most pressing needs is technology-related education. This is true in adults’ personal lives, where the use of information technology may be a valuable enhancement to their way of life. The use of information technology is also increasingly common in the workplace. A strong foundation in technology-related education will help students develop an understanding of the nature of technology and its appropriate selection and use (including computer applications).

Allen Tough’s study of adult learners, “Major Learning Efforts,” is now a quarter of a century old. It would be illuminating to reproduce his study, adjusting the questions to include current computer usage. It is likely that there would be changes in the types of

learning projects that adult learners engage in and the methods by which they pursue them.

In a revised survey, the number of learning projects that involve using computer applications, the Internet, and online course-work would undoubtedly increase.

### **Adults and Technology Education**

Learning basic computer skills and applications is increasingly necessary to function in today's workplace or to pursue personal interests. This knowledge gives people a practical understanding about how their computers and printers operate, how to troubleshoot problems, how to locate an Internet website, and a host of other technology-based skills that help an adult to be more successful in the technological world.

The compartmentalization of technology education into skills training may frequently be a necessary time saver, particularly when training takes place in the work force. However, through the use of innovative instructional methods, adult learning and achievement can be enhanced in a number of areas. As technology educators plan units of study they should not isolate subject matter. By providing technology-related education using a variety of resources and formats including digitized images and eclectic websites the instructor can reduce anxiety in the classroom and build relationships between the learner and what they are learning. This can be done even in a one-hour class that is solely technical in focus. An example of this might be through inserting an amusing image into a presentation in an "Introduction to Personal Computing Class":



Figure 1. "Superman's Girl Friend, Lois Lane" (1961)

This might be the hook that awakens someone's interest in what they are learning. Aside from providing a laugh and lightening the mood, the image might pique curiosity or inspire a personal memory for a class member to share.

Using a solely vocational emphasis during technology training may be overly constraining for third-age or lifelong learners who are taking a class out of "curiosity" or "intellectual inquisitiveness" or for "becoming," words often used to describe characteristics of lifelong and Third Age learners. Intellectual capabilities, motivation, conceptual



## Using Eclectic Digital Resources to Enhance Instructional Methods for Adult Learners

knowledge, and contemporary skills associated with information technology are all important factors that come into play when designing a technology skills course for adult learners.

Segmentation of knowledge or skills “poorly serves a world where career changes are frequent and cross-disciplinary communication is needed to solve systemic problems”

(National Research Council, p. 53).

“Skills” learning is essential in technology education but can be enhanced tremendously through the use of innovative learning strategies. One educator, not speaking specifically about technology, wistfully writes: “The best days for me were those when my students and I were on the same journey and none of us knew exactly where it would take us” (Curtiss, p. 30). Deciding in advance that only a specific skill or skills are important significantly narrows a student’s way of thinking and reduces the chances of serendipitous discovery of something unexpected or wonderful by confining learning technology-related skills to simply mastering a skill set, rather than having that skill set put in a sociological, historical, philosophical or literary context. Also, enlarging the learner’s role through an eclectic derivation of approaches during instruction creates an active environment for the students, resulting in more personal ownership for their learning efforts (Hiemstra and Sisco, p. 5). Adding information of varying formats to a technology training session adds relevancy and relatedness to technology education. Using this approach may be what, as Bruner (*Culture*, p. 93) refers to it, “gets into” the students’ minds and makes them more receptive to the educational experience they are having.

## **Technology Skills and Integrated Learning for Adult Learners**

To many adult learners, a computer is a very serious thing. There is nothing fun about a computer. There are computer jokes, but they aren't affectionate. Computer cartoons are likely to involve the impending doom of the machine at the hands of a frustrated user holding a large mallet. Many people work with a personal computer eight hours a day and would never give it a name. Cars, boats, and airplanes (even bombers) are sometimes affectionately called "she" and have names painted on them. A computer is likely referred to as "It," if not something worse. Why do students so often immediately feel an almost adversarial relationship with this inanimate object? Students may have memories of failed attempts to master a new skill, a new language, some new appliance or machine, and are not eager to repeat the experience. The computer can be particularly intimidating to those first approaching it. A technology educator can do a great deal to ease the concerns of adult learners by using motivation, mood, and curiosity to relieve the tensions that occur during so many technology training sessions. A brief example of contextual, integrated learning is as follows.

In computer technology a bug is a coding error in a computer program. In 1944, Grace Hopper, then a young Naval Reserve officer, went to work on the Mark I computer at Harvard. As Admiral Hopper, she later described an incident in which a technician is said to have pulled an actual bug (a moth, in fact) from between two electrical relays in the Mark II computer (Raymond, p. 94).

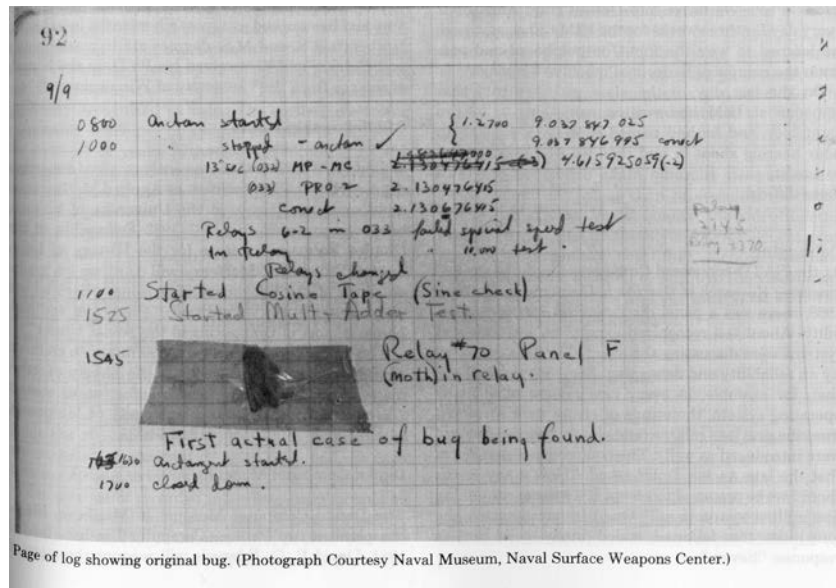


Figure 2. First Actual Case of Bug Being Found in ["Anecdotes"], *Annals of the History of Computing*, (1981)

The use of historical and visual contexts can make a student feel less like a stranger in a strange land during a technology training session.

Kidd (1973, p. 282) writes: "If the attention of the learner is fully engaged he will want, in increasing measure, to experience the subject matter in all its fascination, or its difficulty, even its bewilderment." Even when adult learners are focused on learning a specific skill set, there is a wealth of historical, literary, and humorous digital resources for technology educators to draw upon and insert into a short or long-term technology-related course to enhance the learning experience.

Venkatesh and Speier's (1999, p. 16) study of mood during computer technology training suggests that individuals who have positive moods at the time of training will have greater intentions to use that technology than those individuals who had neutral or bad moods. A person arrives at a training session in a certain mood. An instructor can choose to

ignore that, or to capitalize on it by restructuring the mood of the classroom if necessary to include brief, pleasant, and unexpected diversions from the material to be covered.

### **Librarians, Technology Education, and Eclectic Digital Resources**

Librarians are frequently in the position of providing computer/Internet-related training for adults. Librarians also are highly knowledgeable about electronic resources and digital resources available that could be used to supplement technology training sessions. For example, many adults find the World Wide Web (WWW), one component of the Internet, a series of blind alleys. A librarian/technology educator can decrease confusion by providing supplemental digital resources about the Internet's history and sociology. This can give the student a personal relationship with, and some perspective on, the interconnected online world. At what stage of its development was the Internet when the student was young? For many adults, it can be amazing to discover that there was even a glimmer of the Internet that long ago. An important catalyst for the creation of what eventually became the Internet was the successful launch of the Russian satellite, Sputnik. Some students might be intrigued both to learn about this connection and then to hear the original telemetry from Sputnik I as it passed overhead broadcast as a .wav file over the Internet (NASA). This type of information ties life and technology together.

The University of Virginia's Center for Technology and Teacher Education website contains a component that includes lesson plans for integrating technology into classrooms. These particular lesson plans prepare K-12 teachers to integrate technology effectively in the content areas of English, mathematics, science, and social studies. The English education section is "created with concern for the holistic impact of technology on

learners and teachers, rather than simply focusing on training to acquire technical skills.”

Within the “English” module, there is a lesson plan on “*Mark Twain in His Times*”. This website:

Focuses on how "Mark Twain" and his works were created and defined, marketed and performed, reviewed and appreciated. The goal is to allow readers, scholars, students and teachers to see what Mark Twain and His Times said about each other, in a way that can speak to us today. Contained here are dozens of texts and manuscripts, scores of contemporary reviews and articles, hundreds of images, and many different kinds of interactive exhibits (Railton, 2004).

This website is one example of integrating digitized subject matter to enhance the subject area being taught. It also demonstrates the integration of history and literature to the student via digitized resources. The *Education World* website includes a lesson plan called “Revisiting Walden Pond in 2003” (Modenbach, 2003) that offers many cross-discipline options in history, math, science, language arts. The module also provides a computer lab option. Hyperlinks to web source material on *Walden*- related essays, old and new photographs, maps, and poetry are included for students to learn more about Thoreau and Walden Pond.

It is possible to tweak this type of learning strategy for adult technology students. During a class/course on a technology-related skill, brief portions of literary-related websites can be incorporated to take advantage of the students’ existing knowledge. Telling stories is a major method of transmitting information and sentiment via popular culture. Leo Marx pointed out in his insightful study *The Machine and the Garden* that many American literary works “have at their heart the unresolved conflict that results from the increasing domination of the physical world by the machine. Indeed it is difficult to think of a major American

writer upon whom the image of the machine's sudden appearance in the landscape has not exercised its fascination" (1964, p. 16).

If a librarian only has a 2-hour time slot to give 25 adult learners an "Introduction to the Internet" training session it may seem overwhelming, or a waste of time, to include marginal material. Yet this type of information often "speaks" to certain people and arouses their interest in the class. Eclectic information provides the answer to the question of why browsing through websites on the "Information Super Highway" is often called "surfing" the web. According to librarian Jean Armour Polly:

Yes, NEXIS credits me with first published use. You have to remember that in 1991-92, the Internet was NOT as we know it today. It was MUCH harder to use, there were no indices as we have now, and you had to know a lot of arcane commands. It was an art, not a science. Today we navigate ships using GPS, in those days navigating the Net was more like ancient Polynesian wayfinding by memorized star pairs, reading patterns of phosphorescence in the waves, and knowing the habits of pelagic birds ... I wanted something that expressed the fun I had using the Internet, as well as hit on the skill, and yes, endurance necessary to use it well. I also needed something that would evoke a sense of randomness, chaos, and even danger. I wanted something fishy, net-like, nautical. (Polly, *Studio B Interview*)<sup>23</sup>

Weinstein writes: "Learning begins when feelings are stirred and thought swiftly flows because of habits that are rendered useless and new strategies are necessitated environmentally"<sup>24</sup> (55). The history of technology is full of blood, sweat, tears, and software. Helping students navigate by interconnecting a particular piece of technology to its historical, political, or sociological roots through the use of digital resources can give them a sense of context and integration when they are engaged in a technology-related educational situation.

Adult learning is sometimes impeded by anxiety and tension (Kidd, p. 99). Dwayne Harapnuik writes that helping adult learners overcome their fear of technology is one of the

first steps in creating a successful learning environment. What are adult technology students afraid of? According to Harapnuik: “Fear of wrecking the computer; fear of breaking the system; fear of loosing their data and a whole host of related or even unrelated fears” (1998, p. 9). Those unrelated fears might also correspond to wariness towards change or to a lifetime of absorbing literature of all types in which the computer/technology is an adversary, rather than an ally. In *The Bug*, Ellen Ullman (2003) describes a fictional character’s “deeply human response to this machine that presents itself as infallible: the quick, intimidated fear that whatever had gone wrong could only be the fault of the human being, whose nature it is to err.” By incorporating themes from various literary works into a technology-training class/course, an instructor can provide a diverting stimulus to the material at hand and also show students that maybe they are feeling the same way as many literary giants once did.

Most adult learners probably have a favorite variety of literature, whether classic or contemporary. In *The Bug*, Ullman (2003) reinvents the famous story of Dr. Frankenstein and his monster as an allegory for the birth of the computer, setting her story in the subculture of programming engineers in Silicon Valley in 1984. A review of Ullman’s book captures the tone of the novel: “The machine sitting on your desk that you gaze into every day for hours at a stretch, the one that brings you e-mail, news, information, culture and a multiplicity of templates with which to organize the fruits of your mind’s labor – Ellen Ullman wants you to know that it’s a monster” (Anastas, p. 6). Students need practical and contextual information to understand that some of their anxiety has been ingrained in them since childhood. Edward Tenner’s book *Why Things Bite Back* (1996, p. 3) contains a chapter titled “Ever Since Frankenstein,” in which he describes literary takes on “industrial and postindustrial humanity’s perennial nightmares ... the machine that passes from

stubbornness to rebellion. Tenner uses Rod Serling and Stephen King as examples of two modern authors that have carried on the tradition of Mary Shelley's *Frankenstein* and the unintended consequences of technology. Readers of comic books may be familiar with the character Brainiac "a ruthless extraterrestrial villain - in reality an ingenious humanoid computer - created by the sinister computer tyrants of a far-distant planet- who has been an implacable foe of Superman since July, 1958."

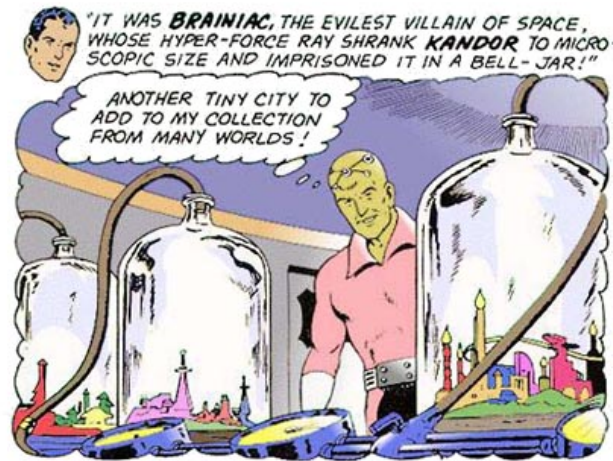


Figure 3. "Brainiac", (*Superman Through the Years*). (2000).

All of these authors are reaffirming a literary motif of the computer/technology as an enemy that began many years ago.

James Kidd, in his "Ten Commandments for Educators," wrote that there are certain ideals that all good instructors should profess, the last of which is: "Thou shalt remember the sacredness and dignity of thy calling and, at the same time, Thou shalt not take thyself too damned seriously" (1973, p. 306). Earlier in this article, the lack of sympathetic computer humor was discussed. This lack might be ameliorated through a search for public domain digitized music. This would serve as a lesson in searching the Internet, in copyright, and in file-types. The instructor could challenge the students in a class to come up with brief lyrics



extolling their computers in the vein of “Little GTO,” the 1964 hit by Ronny and the Daytonas, in which Ronny describes the GTO in loving technical detail: “Three deuces and a four speed, and a 389” or the Beach Boys’ “409”: “My four-speed, dual-quad, posi-traction 409!” (Leo’s Lyrics, 2003). The instructor could also stimulate some thought and discussion by questioning how seriously we can take technological predictions that we hear today by having the class consider the quote by IBM executive Robert Lloyd, speaking in 1968 about the microprocessor, the heart of today’s personal computers: “What the hell is it good for?” (Cerf, p. 209) Or this expert prediction and image from 1949: “... computers in the future may have only 1000 vacuum tubes and perhaps weigh only 1 ½ tons”<sup>40</sup> (Hamilton, p. 258).

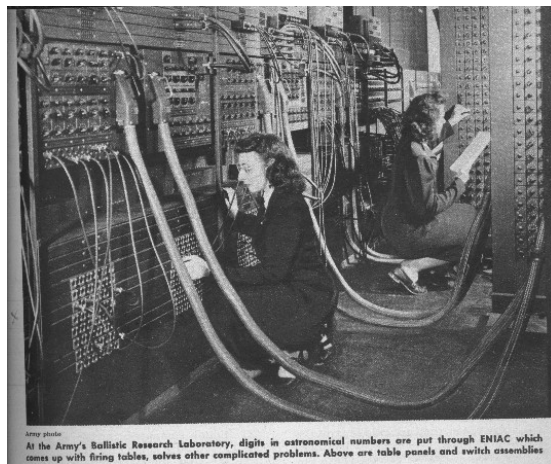


Figure 4. “Researchers and ENIAC,” *Hamilton*:163 (1949).

## Conclusion

The number of adults involved each year in technology training or education endeavors is steadily increasing. (Hiemstra and Sisco, p. 3). Adult learners seek out new skills and education for a number of reasons. Some need professional training in the skills necessary to perform their jobs. Others need to evaluate the information they are finding on

## Using Eclectic Digital Resources to Enhance Instructional Methods for Adult Learners

the Internet. Many want to be able to communicate with friends and family in another state or country. All have a need to learn that is grounded in their daily lives

Traditional bastions of science education are beginning to realize the benefits of broadening the outlooks of their students as well as some of their curriculum. In “Art is a Necessity for Techies, Too” Ann Wilson Lloyd (2002, p. 50) writes about an infusion of the visual arts at the Massachusetts Institute of Technology (M.I.T.). Jerome Friedman, the Nobel laureate and a M.I.T. physics professor, said:

Visualization is so important in science and technology. Teaching about art challenges students creativity ... It forces them to look for unprescribed solutions and liberates their thinking. The changing paradigms of art history run parallel to scientific revolutions, whereby no model is sacred but must be continually tested in terms of new experiences (2000, p. 52).

Visual models are crucial to the understanding of many ideas in the physical and biological sciences. Dance is linked with kinesiology. Music and physics are interrelated; the physics of sound is the physics of music. This broadening of curriculum, instruction, and perspective should also apply to technology education.

Librarians are perfectly poised to combine sound pedagogy with their expert knowledge of available digital resources to promote adult achievement in technology education. An instruction program integrated with evocative digital resources provides the opportunity for instructors to reduce anxiety and to help their students make connections and form relationships across the boundaries of classroom, discipline, skill, and background. By using eclectic digital resources to enhance instructional methods, adult learners can draw on both what they have learned in life and are learning in the classroom.

## References

- [Anecdotes from the History of Programming Languages Conference Banquet, Los Angeles, June 1978] (1981), *Annals of the History of Computing* vol. 3 no. 3: 283-286.
- Anastas, B. (2003), review of *The Bug*, by Ellen Ullman. *New York Times Book Review*, 15 June.
- Apps, J. W. (1981), *The Adult Learner on Campus: a Guide for Instructors and Administrators*, Follett, Chicago, IL.
- Bruner, J. (1996), *The Culture of Education*, Harvard University Press, Cambridge, MA.
- Cerf, C. and Navasky, V., comp. (1984), *The Experts Speak: the Definitive Compendium of Authoritative Misinformation*, Pantheon, New York, NY.
- Chickering, A. W. (1983), *Arthur Chickering on Intentional Human Development as a Unifying Purpose in Higher Education*. [videorecording], interview by John M. Whitely at Wake Forest University, 28 October.
- Curtiss, C. "Losing the art of teaching to the science of instruction", *Education Week*, Vol. 19 no.2: 30.
- Friedman, J. (2002), "Art is a necessity among techies, too." *The New York Times* 15 December.
- Hamilton, A. (1949) "Brains that click," *Popular Mechanics*, Vol. 91 no. 3: 162+

## Using Eclectic Digital Resources to Enhance Instructional Methods for Adult Learners

Harapnuik, D. (1998) "Inquisitivism or "the hhhmmm??? What does this button do?" approach to learning: The synthesis of cognitive theories into a novel approach to adult education." 4 January, available at: [www.quasar.ualberta.ca/nethowto/publish/inquisitivism.htm](http://www.quasar.ualberta.ca/nethowto/publish/inquisitivism.htm) (accessed 2 August 2004).

Hiemstra, Roger and Burt Sisco. (1990), *Individualizing Instruction: Making Learning Personal, Empowering, and Successful*, Jossey, San Francisco, CA.

Kidd, J. R. (1973), *How Adults Learn*, Association Press, New York, NY.

*Leo's Lyrics Database*. (2003), available at: [www.leoslyrics.com/index.jsp](http://www.leoslyrics.com/index.jsp)  
(accessed 30 July 2004).

"Lois Lane, Superman's Girlfriend" (1961), Sparta, Ill: National Comics Publications, No. 24  
(April).

Lloyd, A.W. (2002) "Art is a necessity among techies, too", *The New York Times* 15  
December.

Marx, L. (1964), *The Machine in the Garden: Technology and the Pastoral Ideal in America*.  
Oxford University Press, New York, NY.

Mezirow, J. & Associates. (1990), *Fostering Critical Reflection in Adulthood: A Guide to Transformative and Emancipatory Learning*, Jossey, San Francisco, CA.

Modenbach, K. (2003), "Revisiting Walden Pond in 2003." *Education World*. 11 April 2003.  
available at: [www.educationworld.com/a\\_curr/profdev063.shtml](http://www.educationworld.com/a_curr/profdev063.shtml)  
(accessed 30 July 2004).

NASA. "Sputnik: the fortieth anniversary"

Using Eclectic Digital Resources to Enhance Instructional Methods for Adult Learners

updated February 21, 2003 by Steve Garber, NASA History Web Curator. available at:  
<http://www.hq.nasa.gov/office/pao/History/sputnik/index.html>  
(accessed 29 July 2004).

National Research Council. Commission on Physical Sciences Mathematics and  
Applications. Computer Science and Telecommunications Board. Committee on  
Information Technology Literacy. (1999), *Being Fluent With Information  
Technology*.

Polly, J. A.. *Studio B Interview*. (2003),  
available at: [www.studiob.com/content](http://www.studiob.com/content)  
(accessed 19 May 2004).

Railton, S.. *Mark Twain in His Times*. (2004), Special Collections, University of Virginia  
Library. available at:  
[etext.virginia.edu/railton](http://etext.virginia.edu/railton) (accessed 29 July 2004).

Raymond, E. S. (1996). *New Hacker's Dictionary*, 3rd ed., MIT, Cambridge, MA.

Smith, R. M. & Associates. (1990). *Learning to Learn Across the Lifespan*, Jossey, San  
Francisco, CA.

“Superman Through the Ages!” (1995), site founded, designed, produced, and maintained by  
Great Rao. available at: [theages.superman.ws/Encyclopaedia/brainiac.php](http://theages.superman.ws/Encyclopaedia/brainiac.php)  
(accessed 30 July 2004).

Tenner, E. (1996), *Why Things Bite Back: Technology and the Revenge of Unintended  
Consequences*, Knopf, New York, NY.

Using Eclectic Digital Resources to Enhance Instructional Methods for Adult Learners

Tough, Allen. (1978) "Major learning efforts: recent research and future directions", *Adult Education*, Vol. 28 no. 4: 250-263.

Ullman, Ellen. (2003), *The Bug: a Novel*, Doubleday, New York, NY.

University of Pittsburgh. College of General Studies. (2003), *Adult and Continuing Education*, rev. 11 December, available at: [www.pitt.edu/~cgs/third\\_age.htm](http://www.pitt.edu/~cgs/third_age.htm) (accessed 30 July 2004).

University of Texas at Austin. Continuing & Extended Education. (2004), *Third Age University*, last modified 29 March, available at: [www.utexas.edu/cee/thirdage](http://www.utexas.edu/cee/thirdage) (accessed 30 July 2004).

University of Virginia. Center for Technology and Teacher Education. (2004), *Content Areas*, last modified 29 March. available at: [www.teacherlink.org/content](http://www.teacherlink.org/content) (accessed 29 July 2004).

Venkatesh, V. and C. Speier. (1999), "Computer technology training in the workplace: A longitudinal investigation of the effect of mood", *Organizational Behavior and Human Decision Processes*, Vol. 79 no. 1: 1-28.

Weinstein, Norman. (1997) "Socrates at the terminal", *Educom Review* vol. 32 no.6: 52-55.